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AN EVIDENCE-BASED APPROACH TO PROFESSIONAL DEVELOPMENT PLANNING IN LARGE STATE EDUCATIONAL SYSTEMS

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Introduction

This paper presents of a systems-level approach for adjudicating the prioritization, selection, and planning of inservice professional development (PD) for teachers. We present a step-by-step model for documenting and assessing system-wide 'bids' for professional development programs.

There is little published critical analysis or empirical data on the efficacy of *system-wide* professional development planning or systems. Numerous examples of state professional development plans and strategies are available from Ministries, Departments of Education and regional authorities. These consist of overall policy goals and strategic plans, target areas, reports on particular professional development programs, their contents and participants. Over the past three decades, federal and state governments have commissioned numerous summative reports on funded professional development programs in literacy, numeracy, indigenous education, gender equity and other areas.[1] Yet there is a lack of documented analysis of the planning or efficacy of state system level strategies. There also are no theorized or evidence-based models for how a system might assemble or stage the selection and implementation of systems based plans.

The current policy push is for increased systems accountability and for improved teacher quality. PD is seen as a key element of these processes. *Yet there is no 'benchmark' process for vetting and selecting system-wide PD.*

In what follows, we review key literature in teacher professional development, defining relevant terms. Our aim is not to exhaustively cover the literature. We cite several major published reviews here. Here we use the literature to define the overall goals and parameters of PD as

[1] See DEST reviews http://www.dest.gov.au/common_topics/publications_resources/, accessed 1/11/08.

an educational activity. We then explain and outline the phases of the model.

This report makes no normative judgments about current Queensland PD priorities, targets or programs. Systems must make choices about the concentration of professional development resources and the alignment of PD with overall policy goals. Our purpose here is to provide an evidence-based approach – a selection, development, implementation and evaluation cycle – that can be used to identify, sort and prioritise policies and programs.

Appendix A of this paper describes a model of "informed professionalism" (Schleicher, in press/2009) used in the proposed model. Appendix B of this paper identifies key medium-term (5-10 year) future trends for demand in professional development. It is based on an analysis of emergent economic and socio-demographic conditions and anticipated policy developments. There we make 'educated guesses' of medium term system policy needs. In each case, we outline arguments and resources for future 'bids' on state PD resources.

Proposed is a six-phase process for the review and selection of systemic and centrally mandated professional development programs. These six phases set the grounds for presentation and refinement, submission and review of professional development proposals. They can be used as a template for the tendering and proposal process within the Department.

These phases require that each submission:

(1) Identify a specific professional issue or educational problem;

(2) Clarify and distill this by reference to evidence in published literature and/or empirical data;

(3) Target a specific sub-cohort of teachers who would benefit from new learning;

(4) Reframe the problem by reference to specific domains of teacher knowledge;

(5) Select an appropriate mode of delivery; and

(6) Outline an evaluation plan for systematic follow-up.

Professional Development: What works?

A vast qualitative and quantitative international literature examines the variable efficacy of professional development of teachers (see Meiers & Ingvarson, 2003; Timperley, 2007 for Australian and New Zealand reviews of research). The published literature on school improvement and reform consistently shows the value of systematic, well-targeted, well-resourced and well-led PD (Fullan et al.). It also shows that the overall improvement of educational outcomes depends on teacher quality (RER, 2008; OECD, 2005). Yet there is a large gap between the published literature on professional development – much of it based on academic/practitioner partnerships – and the documentation available within state systems on PD. There has been a neglect of systems formative and summative evaluation of the effectiveness of inservice (Meyers & Ingvarson, 2003).

In many states, the tendency has been to deliver PD on the basis of system-wide priority and earmarked funding, engage in short term survey/questionnaire feedback on aspects of delivery, without longitudinal evaluation and follow-up. In almost all cases, we lack data on the *longitudinal efficacy* of professional development.

This is particularly important given Timperley et al.'s (2007) finding that effective professional development is contingent on support for ongoing opportunities for application of new teacher knowledge and skills. A notable exception to this would be the early 1990s implementation of the Year 2 Diagnostic Net, where Queensland teachers were provided with inservice that systematically linked to practical implementation and feedback, with ongoing opportunities to use, reflect upon, theorise and refine their newly acquired diagnostic skills. The problem, then, is that while we know that inservice PD can make a difference in the quality of educational processes and outcomes – at the state level, there is very little longitudinal evidence on which contents and modes actually work.

There is a compelling case for "informed professionalism" (Schleicher, 2007) and "evidence-based teaching" (Darling-Hammond, 1990) as central to systemic improvement (see Appendix A). These are arguably more central to improved outcomes than curriculum reform, assessment and accountability measures per se. Overall teacher quality, measured by a range of proxy measures, has a strong and decisive impact on student outcomes (OECD, 2005, 2008).

Yet many professional development programs have been justified through advocacy of a particular curriculum or pedagogy with inadequate theory and empirical evidence.[2] The risk is that PD activities not built on evidence about teacher needs, teacher learning and knowledge, and differential PD effectiveness may become solutions in search of empirically identified problems. Further, in an era of increased funding

[2] Timperley et al. (2007) conclude that sustainable and effective PD requires an accessible theory base.

accountability, there is an urgent need to better monitor and track where system and school-level PD funding goes, with what concrete results.

As part of the New Zealand Ministry's *Best Evidence Synthesis* program,[3] Timperley, Wilson, Barrar and Fung (2007) completed the most comprehensive meta-analysis of studies of PD to date. While their focus is on New Zealand, they also review US and UK programs in specific areas. Their strategy is to shift the focus from program delivery to a focus on conditions and outcomes of teacher learning – identifying those elements of PD that appear to generate teacher learning and knowledge affiliated with improved student outcomes. Their work includes a metanalysis of published PD effects data on student outcomes and multiple commissioned case studies of PD programs of curriculum areas, duration, scale and modes. They include data from a broad range of outcomes indicators (e.g., test-scores, retention rates, but also data on engagement, social outcomes, changed classroom practice, teacher and student self-reports of learning).

Timperley et al.'s (2007) general claims about the characteristics of effective inservice are similar to Meiers and Ingvarson's (2003). The New Zealand commissioned case studies corroborate the extensive body of qualitative work on PD (e.g., Hargreaves, 2007; Day & Sachs, 2005; Day, 2005). They document a complex picture of school-level ecology that requires sustained, local opportunities for teachers to learn, to reflect and to translate their learning into changed practice. We here use their studies to build categories for selecting the modes of delivery and evaluation for state PD programs.

While the literature on system PD strategy is thin, there is a vast published literature on the variable impacts of *specific* professional development programs and strategies. These range from studies that show the impact of PD on classroom practice (e.g., Rowan et al. 2005) to those studies that show the differential impact of professional development on student achievement in key learning areas (e.g., Gould, 19xx; McNaughton, et al. 2005). In Australia, efficacy studies of large-scale inservice work has been well documented in the areas of mathematics education (xxxx), middle years of schooling, language and literacy (Luke, Elkins et al. 2003), and early childhood education (xxxx). Meiers and Ingvarson (2003) compared the efficacy of specific statewide programs in, for example, NSW and WA mathematics education (p.6), describing key considerations in the design and evaluation of successful PD. These include:

[3] This program commissioned critical literature reviews, surveys of studies, and meta-analyses of empirical data in key areas – e.g., Maori education, mathematics curriculum, values education. These resources used by the Ministry and schools for policy formation and debate: see http://www.educationcounts.govt.nz/themes/BES, accessed 8/9/08.

- a focus upon student outcomes not limited to conventional test measures;
- a broad range of evidence, including classroom observation data;
- a longitudinal, rather than short term focus on change;
- explicit linkages of teacher learning with student learning;
- consideration of program design with a focus on teacher knowledge;
- a focus on the local ecological context of the school, with specific attention to school-level leadership.

We will draw from this literature throughout this paper to frame aspects of the proposed model.

The tension between systemic and local PD

There is a tension between the central prescription of professional development programs and their optimal realization in local school contexts. In Canadian case studies, Hargreaves and Fullan (2005) found that central policy mandates and priorities were frequently the impetus for effective school-based professional development. At the same time, findings of the professional development research and the consistent message from school reform literature is that highly effective professional development is locally-based and effective at the school and cluster level (e.g., Little, 2002; Cochran-Smith, 2000; cf. Welner & Oakes, 2007).

The history of professional development in Australian education has featured progressive decentralization and marketisation of services. In the 1980s, major federally funded and centrally administered professional development programs were undertaken on gender equity, literacy, and equity (e.g., Disadvantaged School Program, Early Literacy Inservice Course). Following the closure of the Commonwealth Curriculum Development Centre in the 1980s, many states maintained large central professional development infrastructures and programs in the early 1990s. There are ongoing centrally funded and staffed programs in areas like information technology, indigenous schooling, pedagogy, and literacy. This has enabled state departments to establish programs to support policy priority areas and to support curriculum renewal. But there has been a general move away from the direction and maintenance of medium and large-scale professional development by central state authorities.

The 2006 implementation of national summer schools in literacy education was the first major professional development of national scale since the 1990s. Some states have conducted larger scale programs in the last decade (e.g., NSW 'Quality Teaching', Queensland's 'Productive Pedagogies', Tasmania's 'Essential Learnings', Tasmania's 'Spaulding' phonics program, NSW initiatives in Mathematics). Other states have severely curtailed state-level, centrally-funded PD activity (e.g., South Australia).

The ongoing trend has been to devolve professional development to schools and clusters, under the premise that principals and teachers are best positioned to select and implement school professional programs. One of the consequences of the devolved model has been the proliferation of inservice programs and approaches, consultants and providers, making state-level accountability on the effects or outcomes of local PD expenditure difficult. *No states have systems in place for aggregate reporting of the quality and efficacy of school-based professional development activities.*

This tension between central mandate and local practice, between system impetus and structured policy, on the one hand, and teacher 'ownership' and engagement, on the other, creates a difficult and potentially contradictory situation for central planning. On the one hand, major policy impetus, priority setting and funding models can set priorities and models ("informed prescription"). It also can outline program structures and contents. It has the potential to target particular regions and schools who are experiencing difficulties. These interventions can optimally set the conditions for locally-based innovation that is sustained by teachers and students ("informed professionalism"). Systems must develop strategies of supporting, tracking and monitoring the quality and effectiveness of school and cluster-based programs. The problem is compounded by evidence that when outsourced to schools on a marketised basis, systems have difficulty tracking overall quality and efficacy of professional development models (Levin, 2008).

It is clear that blanket, large-scale systems mandating of programs in itself has major risks and problems. It can deliver knowledge to teachers who already possess that knowledge. It can provide overarching approaches that may have variable relevance to local contexts.

But it is equally clear that simply outsourcing PD to schools for principals to allocate on a discretionary basis has, at best, highly variable results. The devolved approach has established multi-million dollar markets for professional development. Schools can choose from a range of providers, consultants, publishers, academics and independent companies. Unlike in Ontario, there is no registered or accredited list of PD providers – and no independent checking of the quality of providers or PD contents.

Local devolution of PD has limited the capacity of state departments and curriculum authorities to resource and support priority areas. While the model proposed below does not address the structural problem – it provides the grounds for system-level analysis of the potential value and impact of professional development.

The model could also provide the means for cluster and school-level accountability on professional development activities. That is, principals and school leadership could undertake a similar process of analyzing

professional development needs, targeting programs, selecting providers, and evaluating outcomes.

Given the acknowledged limits of principals' time and expertise at dealing with empirical data – the model would have to be scaled down and simplified. Nonetheless, it could provide a proforma for assessing and evaluating PD bids at the school, cluster and regional level.

Our view is that centrally mandated professional development can make a difference for schools and teachers. Consider the current situation where principals are pressed to improve NAPLAN test scores as an example. The context of accountability via standardised national testing has created a situation where many school leaders are actively seeking to invest professional development funding in those inservice activities that will yield improved student test outcomes. Yet there is a lack of school-level data analytic capacity, and further, the capacity to clearly identify the nature of the educational impediments to improved performance. School leaders therefore are likely to turn to the army of consultants, publishers and other PD providers – again, lacking empirical data on the relative efficacy of the approaches to PD they selected.

Contrast this with the evidence-based centralized approach to literacy improvement undertaken in Canada. The ongoing work of the Ontario Literacy and Numeracy Directorate – a Ministry branch of over 100 staff focusing on policy implementation, data analysis and professional development – is an exemplar of system-wide professional development that has led to improved teacher learning and student outcomes (Levin, 2008). In that model, PD resources were developed, evidence accrued and analysed for intervention, content areas for focus targeted, and the central Ministry team provided support to specific teacher sub-cohorts, regional school districts and clusters to select and develop PD programs. These were dovetailed with curriculum changes, and evaluated at the system, district and school level with evidence on student outcomes. Schools experiencing problems were identified through analysis of data on school performance.

The strong lesson from Ontario is the alignment and reiteration of common messages and goals by those responsible for PD, curriculum, assessment, school and district leadership, parent and community relations: this permeated to classrooms. Note here that PD was a key plank in an overall systemic educational strategy – not a wholly discretionary, local matter, nor the result of simple competitive bidding between branches within the Department/Ministry.

State-wide and cluster-based PD must have a strong, targeting rationale, identifying specific teacher cohorts and school communities for locally-based teacher learning and pedagogic change. But it must be designed on the basis of the best available empirical evidence and prior professional

development benchmarked practice; and it must be systematically evaluated at the local and, where relevant, systems level. It also must have a defensible normative model of teachers and teaching, teacher knowledge and teacher learning.

Principles of the proposed model

The proposed model is evidence-based in two ways: (1) It draws upon the research and development literature on teacher education and professional development as a basis for each of its premises and phases; (2) It provides a process for the use of evidence to make bids for and to prioritise professional development activities of a state system.

As noted, it aims for "informed", "adaptive" professionalism. It is premised on central tenets from the teacher education literature and research. These are:

- That teacher education and development, training and socialization is an ongoing process, where teachers have different and diverse specific needs and face specific challenges at different junctures in their careers (e.g., Feiman-Nemser, 2001; Gore & Zeichner, 1994);

- That professional development and training can effectively address larger system and policy goals (e.g., Gore & Zeichner; Darling-Hammond; Levin, 2005);

- That professional development is most effective when it has a demonstrable relevance and attention to teachers' existing practice, local school and community context (Meiers & Ingvarson, 2003; Hargreaves, 2002);

- That PD learning can effectively be defined and categorized in terms of demands on teacher learning, knowledge and practice (e.g., Shulman, 1990; Darling-Hammond & Bransford, 2003);

- That teacher learning can be optimally addressed through timely, well-resourced, and relevant modes of professional development (Timperley et al. 2007).

- That the translation of PD learning into improved practice and better outcomes requires opportunities for reflection, practical theory/practice links, and sustained opportunities to apply new knowledge (Timperley, 200x).

- That there are diverse ways of documenting and evaluating PD effects upon teacher knowledge and student outcomes (Meiers & Ingvarson, 2003).

A hypothetical PD scenario: Primary maths

To understand how the model would work, consider this hypothetical scenario. It is described not in terms of the extensive professional development literature on mathematics education. We present it here to show how the proposed 'model' would play out in a policy analysis and setting sequence.

In state X, there is evidence that year 5 mathematics scores are not meeting expectations in NAPLAN results. This has prompted the nomination of primary mathematics as a focus for state wide professional development support and intervention. A disaggregation of state testing data, further, indicates that the problem is particularly acute in lower and low-mid IRSED areas, with less evidence of decline or residualisation of achievement in middle and upper socioeconomic clusters. This would appear to justify a professional development focus on early mathematics, with a priority focus on lower socioeconomic schools.

But who exactly requires support? Consultation with teacher education institutions and focus groups indicate while most primary teachers successfully complete the curriculum methods courses, very few have undertaken advanced maths in secondary school and few have any formal university mathematics study. Consultation with principals and several selected focus groups with teachers in target schools corroborates this.

Many schools have adopted a new mathematics textbook and program – but teachers report they are still having trouble determining the pace and rate of instruction, particularly for lower achieving students. Focus groups indicate that part of the problem is that teachers are having difficulty with key concepts. A literature review on mathematics education, professional needs and development suggests that the problem is partly one of "content knowledge" and less one of "pedagogy" per se.

The problem is empirically more complex than initially thought:

- Early career teachers are experiencing difficulty with thresholds in their own lack of mathematical knowledge and expertise;
- Some experienced teachers are experiencing difficulty engaging with learner diversity, requiring more developmental diagnostic skills in maths development and alternative instructional approaches.

On this basis, we could claim that part of the cohort would benefit from professional development in "content knowledge" of mathematics, reviewing basic mathematical concepts and knowledge. Another segment of the cohort, those with requisite content knowledge, requires professional development in "pedagogical content knowledge", focusing on

classroom evaluation, the setting of tasks, and the selection of appropriate strategies for diverse learners, including indigenous children, second language learners and struggling readers.

A review of the international literature on mathematics teacher education and professional development (e.g., Walshaw et al. 2005) indicates that: (1) the improvement of "content knowledge" could be best addressed through intensive short courses (and where relevant, further formal study) with follow-up classroom work; and (2) the "pedagogical content knowledge" can be targeted through the school-based development and implementation of diverse and specialized pedagogies.

This scenario could be run at the cluster and school level as well.

The model

The proposed model has 6 phases. Each proposed professional development priority, area or strategic priority would have to provide documentation on each of these steps and be vetted by reference to each of these steps.

Phase 1: Identify Policy PD Priority
Phase 2: Reframe and Specify Educational Issue and Goal
Phase 3: Identify Teacher Cohort
Phase 4: Categorise Teacher Learning and Knowledge
Phase 5: Select Professional Development Mode
Phase 6: Evaluate Program

PHASE 1: Identify policy priority

Sources for Professional Development Priorities						
State or federal policy priority	*Empirically identified problem*	Student cohort needs	Curriculum renewal	New workforce demands	Operational imperatives	Projected future needs

The origin of a PD priority matters – it shapes the system's understanding of goals, cohorts, requisite parameters of a program, and overall PD philosophy. Bids for PD initiatives come from a range of sources. These include:

- State government strategic priorities specified by the Minister (e.g., citizenship, values, obesity, student depression);

- Federal funding priorities (e.g., funding for literacy improvement, laptops);
- Identified systemic problems (e.g., Indigenous learning, literacy or numeracy achievement, teachers' assessment literacy and use of evidence);
- Needs of emergent targeted student cohorts (e.g., refugees, ESL, special education cohorts);
- Curriculum renewal cycles (e.g., early childhood, QCATS, the new English syllabus, national curriculum);
- Needs specified by teachers' union and professional organisations (e.g., behaviour management, school leadership);
- Workforce shortages (e.g., teacher aids, LOTE specialists);
- Immediate operational imperatives (e.g., health and safety compliance issues); and,
- Future developments (e.g., creativity, sustainability).

Bids from specific Department areas and stakeholders are often stated in general rather than specific terms (e.g., Leadership, IT). These may be short-term reactions to policy debates or controversies, or to emergent educational trends and paradigm shifts. Departmental and stakeholder claims for PD may lack empirical evidence bases, without sufficiently detailed grounds or clarity regarding teacher cohorts for proceeding.

Alternatively, external bids about teacher needs need to be empirically triangulated with other evidence. This would include calls for specific PD by professional organisations and unions. For instance, a regional claim that more resources should be placed into inclusive strategies and special education training, would need to be triangulated with other systems data on student populations and consultations with researchers and other experts on these areas. Consider another illustration: response to current calls for more support and training in behaviour management would still require a more exact specification of the classroom and school-level issues, whether these vary by region and student cohort, etc. Empirical grounds are needed to specify exactly which PD content might be required.

What is needed, then, is a specific analysis of a PD bid: a honing in on a specific educational problem and linking this with specific professional needs and teacher learning requirements. For example, these might entail reframing a literacy initiative into a specific focus on middle years reading comprehension; or reframing the focus on leadership to a specific orientation towards curriculum or pedagogy reform.

PHASE 2: Reframe and specify the educational issue and goal

Sources for analysis and reframing of issue		
Systemic empirical	Commissioned	Extrapolation from

data	exploratory and developmental surveys and studies	national and international studies

This distillation can be done through three sources: (1) existing systemic empirical data on the problem (e.g., test scores, school operations data, teacher cohort and training data, student cohort needs, observational data on the nature of the classroom issue); (2) new survey or purpose-generated empirical data on teachers' needs and problems (e.g., teacher or student self-report via survey, fieldwork, focus groups); or (3) a *careful* extrapolation from Australian and international published studies on teacher knowledge, student needs, school reform and professional needs.[4]

The result would be a specific statement of a problem, rather than a generic area: For example, instead of claiming "we need professional development in IT" – a review of evidence might translate into: "we need targeting professional development on the use of digital learning resources in two key learning areas" or "we need to move primary teachers into video gaming production".

To take another example: the general need for behaviour management strategies would need to be translated into a stronger empirical claim about what specific strategies are needed in specific regions and with different student populations. This might entail, for example, PD on whole-school behaviour plans or, alternatively, PD on classroom management strategies. To illustrate how detailed identification of the problem is necessary consider this scenario: PD on behaviour management strategies for Indigenous schools would by definition have different content than that in other community and cultural settings.

This result is the translation of a general bid by the Department or from stakeholders, into a more refined identification and justification of a specific problem or issue to be addressed through PD.

PHASE 3: Identification of teacher cohort

Teacher Cohort Variables					
Location, region,	Subject area	Grade/phase level	Age, credential	Prior experience/	Student cohort

[4] Consultation with researchers is necessary in extrapolating from the identified needs of a specific national or regional cohort of teachers (e.g., New York teachers, UK urban teachers), to an Australian and regional Queensland cohort. This is due to the variability of policy and systems governance, teacher background, student population, cultural and linguistic context, etc.

community site			level	background knowledge	variables

Systemic professional development priority setting, funding and policies may treat the teacher cohort as homogenous, leading to a 'one size fits all' approach to PD. Given the diverse levels of age and experience, training and background of the teacher population – it is unlikely that all teachers would 'need' or even benefit from the same PD.

This risks, to stretch a metaphor, a 'carpet bombing' approach that provides training to segments of the workforce who may not need it, or who already have expertise in the area. The result would be both educationally ineffective and cost inefficient. For example, in the case of the use of digital learning resources, recent teacher education graduates are more likely to have had relevant training with current technologies because of developments in teacher education. Investment in digital training for that cohort would be a misdirection of resources. Consider another example: the current state literacy PD program is mandated for all teachers, regardless of their levels of background training and expertise. The result is a potential mis-direction of valuable resources. Timperley et al. (2007) point out that effective PD programs acknowledge and build upon existing teacher background knowledge and expertise.[5]

The development of systems data on teachers' variable training levels, background knowledge, sense of "efficacy" in particular knowledge and skill sets (Shavelson, 2003), existing areas of expertise, and professional needs should enable more sophisticated 'targeting' of professional strengths and weaknesses, need and areas for development. This could be easily achieved through periodic on-line surveys.[6]

Phase 2 is a specific identification of which segments of the teaching workforce might optimally benefit from the training. This entails a disaggregation of the workforce by age, experience, training-level, subject-areas and relevant needs. Teacher efficacy self-reports have proven reliable indicators of teachers' relative strengths and areas of need (e.g.,

[5] Successful PD, Timperly et al. (2004) argue, requires the setting of "consonant" and "dissonant" relations with existing knowledge. This is an important point: in instances effective PD does not simply augment and complement existing teacher cohort knowledge, but deliberately critiques and destablises it in order to introduce new knowledge and shift practice.

[6] QUT, QSA and the QTU are working on a 2009-2010 Australian Research Council funded project to develop a survey instrument on teachers' use of the curriculum and training needs.

Shavelson, 19xx; Lau & Hogan, 19xx): teachers will readily report on which aspects of their teaching need support and development.

In this way, *regularly administered survey instruments can identify specific sub-cohorts who would best benefit from targeting professional development programs.* Data on specific teacher cohort needs also can be based on consultations with teacher education programs, data from mentoring and induction programs, and from union and professional organisation data on teacher needs.

From a resource allocation and accountability perspective, the establishment of target cohorts is a key first step to optimizing the effectiveness of PD.

Phase 4: Categorise teacher learning and knowledge

Categories of teacher knowledge			
Content knowledge	Pedagogical content knowledge	Curriculum knowledge	Knowledge of students and communities

By Phase 3, a key goal would have been identified, and a cohort of teachers for priority professional development to address a specific educational problem. This does not resolve the questions around what PD content is relevant for addressing the issue. There are numerous attempts to define and categorise teacher knowledge (Elbaz, 1981; Day, 19xx; Warren-Little, 1994). Timperley et al. (2007) point out that while teacher knowledge needs to be practical and applicable, PD knowledge also should have a defensible and understandable theory base. Defensible theory is necessary to ensure credibility of the program amongst teachers and the educational community – and to provide a conceptual scaffold for sustainable reform of classroom practice.

The most robust and widely-cited model of teacher knowledge was developed by Shulman (1980, 1990) and colleagues at Stanford. It has since undergone significant critique and elaboration. Its initial formulation outlines "content knowledge", "pedagogical content knowledge" and "curricular knowledge" as closely-related components of professional practice.

Content knowledge includes substantive knowledge of the specific fields and disciplines drawn upon in a school subject (Schwab, 1994). School subjects may draw upon but are not limited to traditional disciplinary content (Deng & Luke, 2007). In later work, Grossman, Wilson and

Shulman (1989) subdivide content knowledge to refer to: (1) basic knowledge of a field, (2) "substantive knowledge" of explanatory frameworks and field paradigms; (3) "syntactic knowledge" of how knowledge is generated in the field (i.e., epistemology and methodology) and affiliated beliefs about the field and discipline. This amounts to a definition of the necessary depth or "verticality" of field or discipline knowledge (Bernstein, 2000) required to for effective teaching.

Many of the current debates around teacher preparation and the national curriculum are premised on the assumption that increased disciplinary knowledge is the key to improved teaching and learning. The key point here is that disciplinary and field knowledge is necessary but not sufficient to teach a 'school subject' (Deng, 2006). Teaching a school subject also requires the selection of appropriate and effective pedagogical strategies, knowledge of learner culture, development and cognition, knowledge of the overall curriculum, and knowledge of the overall social goals and aims of schooling (Dewey, 1915).

Pedagogical content knowledge enables teachers to "transform the content knowledge … into forms that are pedagogically powerful and yet adaptive to the variations in ability and background presented by students" (Shulman, 1987, p. 15). For Shulman, pedagogy is not universal, but is contingent upon the specific field content to be taught and upon the variables of student background context, phase of development, and the disciplinary structure of the knowledge in question. That is, in addition to general pedagogical approaches and repertoires (e.g., productive pedagogies), there are field and subject-specific pedagogies that are fitted to the "syntactic" and paradigmatic structures of specific contents.

In an major application of the concept of pedagogical content knowledge for science teaching, Magnusson, Krajcik and Borko (1999) identify five elements: (1) orientation to subject (philosophic approach); (2) knowledge of curriculum (understanding of level-specific curriculum goals and outcomes); (3) knowledge of students (background knowledge, culture and learning needs); assessment knowledge; and (4) instructional strategies. According to Shulman (1990), ***curriculum knowledge*** entails understanding of syllabus, textbook and resource materials available for the teaching of school subjects in particular phases and grade levels.

The Shulman model has been critiqued and augmented by other teacher education researchers and curriculum theorists (for a review, see Deng & Luke, 2007). It is criticized principally for an over reliance on traditional concepts of discipline. Elements of the model are used in Timperley et al.'s (2007) analyses of inservice effects. Their major contribution focuses on the degree of consonance or dissonance between existing teacher knowledge and new knowledge.

The proposed PD model proposes a modified version of the Shulman categories:

- **Content knowledge**: teacher knowledge of specific fields and/or disciplines, including a critical overview of competing paradigms, epistemologies and methodologies;

- **Pedagogical content knowledge**: teacher knowledge of a range of field-specific and general pedagogies, assessment strategies and techniques;

- **Curriculum knowledge**: teacher knowledge of syllabus goals and standards, and available learning resources and text materials;

- **Knowledge of students and community**: teacher knowledge of student background, cultural and cognitive resources, linguistic and community contexts – with a specific emphasis on student diversity - and how these impact upon teaching and learning.

Areas identified in the *Queensland College of Teachers Framework* (2004) like behaviour management and assessment would be categorized as pedagogical content knowledge issues. These categories would be used to specify the foci of the professional development program. It might preclude the mis-direction of professional development resources. To return to our hypothetical scenario, if the primary mathematics problem is a content or "threshold knowledge" (Darling-Hammond, 19xx) issue – the delivery of a generic approach to 'pedagogy' might not generate relevant teacher knowledge and improved student outcomes. In other instances, it might be a matter of providing teachers with an introduction to a new syllabus or learning resources. In yet others, the issue may be that the teachers lack a substantive knowledge of or engagement with students' community cultures, learning strategies and linguistic resources.

These categories of teacher knowledge do not always fit into neat boxes. In many instances, several domains of teacher knowledge would benefit from PD. The extensive corpus of school renewal and development studies (e.g., Fullan, 1990) suggest that whole school curriculum renewal and pedagogical reform will entail all of these elements. But different cohorts of teachers within a school will require different PD emphases. Even where all must be part of the PD program, it would enhance the planning and implementation of the program if it used disaggregated categories to identify teacher knowledge needs. This would make the 'mistargeting' of PD content and delivery less likely.

The categorization would enable both a prioritization of the strategy and a better specification of the relevant theory and contents of the proposed professional development intervention. The contents and modes of the PD program can be selected after a categorical description of what kinds of

teacher knowledge are at issue. Where programs attempt to address more than one level of teacher knowledge, they can aim to sequence these according to teacher capacity and needs.

Phase 5: Select Professional Development Modes

PD Design and Mode							
Goals	Scope/ Cohort	Content	Timing/ Duration	Mode/ Learning Opportunities	Outside expertise	Sustainability	Evaluation

The table above describes 'settings' in PD design and mode. That is, all proposals would have to address these settings. The choices would optimally align with the findings of Phases 1 to 4.

There are a range of effective modes for the provision of inservice education (Meiers & Ingvarson, 2003). These include: short courses, degree upgrading, but more frequently after school and school break workshops, conference attendance, and school-based intervention research. There is also a literature that supports the roles of external critical friends (e.g., researchers, consultants) and teacher/researchers as catalysts in teacher-based action research, design experiments, and local curriculum development (e.g., Cochran-Smith, 2002). But these are not pure types.

Following Timperley et al. (2007, p. 30), each of these specific modes sets a context for particular kinds of learning opportunities:

- listening/watching;
- being observed and receiving feedback;
- receiving student activities and materials;
- engaging with professional readings;
- discussing practice with someone more expert;
- authentic experience of subject in action;
- discussing own theories of practice and their implementation;
- examining student understandings and outcomes;
- analysis of current practice and reconstruction of new practice;
- discussing self or mutually identified practice.

Specific program characteristics appear to correlate strongly with program effectiveness. These include: a focus on sustained teacher learning opportunities, effective use of outside expertise, integration into practice, the ability of teachers to see changing student results. Further, they may feature specific theoretical approaches and specific "methods of inquiry

into … [teachers'] adequacy and improvement of own practice" (p. 30). These would include models like action research, problem-based learning, and peer mentoring.

The New Zealand Best Evidence Synthesis further notes several distinguishing features. It notes that there must be a match between goals and approaches to PD, a 'goodness of fit' between the issue, teacher cohort and approach. The approach of Timperley et al. (2007) is unique. It reconceptualises PD in terms of teacher learning – applying cognitive and learning science models and sociocultural models of learning to professional development. There are a range of considerations in the selection and framing of an inservice model; these include scale, time and duration, use of outside expertise, theoretical and research base, contents, mode of delivery that enables a "range of learning opportunities", role of local leadership, and systematic follow up and feedback (Timperley et al. 2007). They stress throughout the need for PD to enable teachers to work in professional communities, challenges existing teacher knowledge and discourse, and provides diverse opportunities to learn and practice new learning (e.g. Lave & Wenger, 1995). These will, of course, be constrained by issues of scale and cost.

In the proposed model, the selection of PD contents and mode will logically connect with the findings of the other phases. Phase 5 will be informed by evidence gathered and classified in Phases 1 to 4.

For example, the introduction of a new paradigm of teaching in early childhood education (Pedagogic Content Knowledge), or the induction of staff moving to rural and remote or indigenous education settings (Knowledge of Students and Community) would require different choices and settings in mode and design.

Phase 6: Formative and Summative Evaluation

Sources of Evidence for Formative and Summative Evaluation				
Teacher survey, interview, focus group data on program and teaching efficacy	Longitudinal student outcomes data	Classroom and school observational data	Commissioned case study research	Quasi-experimental comparative studies

Meiers and Ingvarson (2005) note that while many Australian approaches to professional development appear to be effective, current policy approaches lack evaluation data. Almost all of the published studies cited by Timperley et al. (2007) were the result of researcher/PD provider collaboration, where university-based researchers were working with the program as it developed. They also note that many of the claims in the professional development literature lack rigorous empirical study. Many larger-scale professional development programs are enacted without systematic, longitudinal evaluation. It would appear that many systems are busy 'doing' PD, but neglect to collect valuable formative and summative data that might inform ongoing developments.

Formative and summative evaluation may include:

- Action-research negotiation and consultation;
- Teacher self-report and peer evaluation;
- Survey and focus groups of teachers as the program progresses;
- Observation of changes in classroom instruction;
- Pre and post program teacher surveys;
- Analysis of teacher planning and curriculum materials;
- Analysis of changes in student performance, work and outcomes;
- Survey, interview and focus groups of students;
- Smaller scale case studies;
- Quasi-experimental comparison of PD intervention versus control schools;
- Longitudinal tracking of teachers and students.

The purpose of formative evaluation is to provide ongoing feedback to the program, so that design and program elements can be altered while the program is underway. It is an intrinsic element of action-research and design experiment approaches. Summative evaluation would address accountability and efficacy issues around larger-scale policy initiatives. School-based and local evaluation would be definition tend to be more qualitative, case-based and informal.

The nature and extent of evaluation is dependent upon the scope and scale of the project. At the school level, peer and self-report can have high degrees of contextual validity. Formative evaluation is best undertaken through survey, interview and focus groups, observation and documentary analysis of student work and curriculum.
Larger, systemic projects enable and require medium and longer-term longitudinal studies through surveys and the tracking of student outcomes. Classical longitudinal design requires at least three comparative data collection points subsequent to the completion of the program. Moreover, summative evaluation can address issues of residualisation of teacher learning, transfer of training, and sustainable impacts on practice and student learning.

CONCLUSION: A PROCESS FOR EVALUTING PD BIDS

The six-phase model presented here is based on a review of the research literature on PD design, efficacy and implementation. Its focus is on teacher learning. It is based on the assumption that systemic PD, centrally-mandated through policy priorities can make a difference in developing teacher knowledge, expanding and improving classroom practice, and improving student outcomes, broadly defined as social and academic.

Large and medium scale improvement of school and student outcomes cannot be achieved through devolved, outsourced and marketised PD at the school level. At the same time, there is strong evidence that teacher learning and effective pedagogy is school-based, highly contextual and occurs optimally through calibrated and sustained work in local school and cluster settings. Consequently, any systemic-PD approach needs to strike a balance between a centralized mandate for PD programs, with their variable and necessary realization in local contexts.

We propose here that:

- The six step model is used as a proforma scaffold for the presentation of bids for systemic PD. This would entail the preparation of formal proposals using the criteria stated here before they are presented to the state PD committees for refereeing and adjudication.

- The six step model be used as a proforma procedure for schools reporting on their annual PD activities. Given the resources available to principals and teachers, it would need to be scaled down and adopted, with less rigorous demands for evidence and documentation. Nonetheless, this would provide a scaffold for the presentation of PD initiatives at the school and local level.

The resulting pro-forma for a PD bid would be statements and short justifications of the following:

PRO-FORMA FOR A PD BID

- Problem or issue (Phase 1);
- Goals (Phases 2, 3 and 4);
- Scope and cohort (Phase 3);
- Teacher knowledge contents (Phase 4);
- Timing/duration (Phase 5);
- Mode of delivery and opportunities for learning (Phase 5);
- Specification of type of outside expertise (Phase 5);

- Provision for sustainability (e.g., ongoing support of practice, materials and resources) (Phase 5);
- Design of formative and summative evaluation (Phase 6).

For each statement, evidence, benchmarks and precedents from the PD literature would be cited. It would be scaled down and simplified throughout for local school and cluster use.

References

APPENDIX A: DEFINING INFORMED PROFESSIONALISM

The model we propose here is based on a model of informed and "adaptive professionalism". The premise is that teacher professionalism is an ongoing process, with the goal of enhanced teacher learning and knowledge to enable "evidence-based" (Darling-Hammond & Bransford, 2004) teaching, with critical engagement with emergent field knowledge and pedagogical content knowledge (Shulman, 19xx).

The current policy emphasis is pushing schools towards short-term approaches to pushing test scores up or solving immediate local problems. One result is a very strong bias towards 'how to' formulae. However attractive these might prove to busy and pressured teachers and principals, the literature tells us that scalable, sustainable improvement of schools and systems relies upon improved professional knowledge (Cochran-Smith, 2007), practice informed by evidence and research (Bransford & Darling-Hammond, 2004), sustained opportunities to translate new learning into practice (Timperley et al. 2007), and an overall focus on teachers as members of professional learning communities (e.g., Fullan & Hargreaves, 2008). It is noteworthy that Timperley et al. (2007) focus on the role of theoretical explanation and tension with existing teacher knowledge and practice as a characteristic of effective PD.

A key finding of international comparative studies like PISA has been the general claim that "high quality/high equity" systems have strong teacher workforce capacity (OECD, 2005, 2007; Schleicher, 2008; Levin, 2008). Typically the support literature documents how the overall status of teaching, simple and uncomplicated syllabus documents, and well-developed local curriculum planning and resources enhance teacher efficacy (Simola, 2005; Sahlberg, 2006). In Finland and Canada, overall teacher quality is the result of a combination of factors, including: an overall community and cultural acknowledge of the status and value of teachers and teaching, high quality teacher education entrants, masters-level credentialing for initial certification, curriculum that demands advanced levels of professionalism, local curriculum development infrastructure, a range of quality curriculum resources, and rich and well-

resourced professional development opportunities (Luke, Weir & Woods, 2008).

PISA studies further claim efficacy for teacher certification or training in elements of classroom assessment (OECD, 2005). Recent reviews suggest the role of professional development in enhancing "teacher leadership" that is conducive to improved student outcomes (York-Barr & Duke, 2004). Hattie's (2002) reanalysis of effects data argues that teacher/pedagogy variables account for up to 15% of variance in student achievement. Further, a major US analysis of the literature, maintains that the strongest proxy for teacher quality is credential/degree levels, with many systems requiring masters level credentials with research components as entry level requirements (Sahlberg, 2004; RER, 2007). The Singapore system sets progressive targets for postgraduate degree upgrading of its teaching workforce. In Finland and Canada, Masters level training has become a prerequisite to credentialing. The overall message is reinforced in the American Educational Research Association's commissioned study on the status of teacher education (e.g., Cochran-Smith & Zeichner, 2005). Teacher knowledge and expertise counts.

Underlying all teacher development models is a normative perspective on teacher professionalism. The Queensland College of Teacher (QCT) standards are similar to models emerging in other Australian states and internationally (for a review, see Mayer, Luke & Luke, 2008). The stated aims of QCT standards are to enhance teacher professionalism; to boost public confidence in the profession; and to promote high quality teaching in schools. It is committed to broad principles of ongoing knowledge generation and construction across the life span, and meaningful social engagement. The QCT standards restate the new workforce "capabilities" (e.g., creativity, higher order thinking, problem solving, collaborative learning) as a priority for the system (cf. Reid, 2005). While they refer to the complexity of teachers' work and general principles of professionalism, the QCT standards do not explicitly engage with a normative model of teaching. Standards are clustered in terms of the knowledge and skill requisites for teaching, for professional relationships and for ongoing professional renewal. Typical of international teacher standards, they are a compilation of preferable skills and characteristics, reflecting longstanding contents of preservice programs.

The above PD model is based on a normative model of "informed professionalism" (Schleicher, 2007) and "adaptive expertise" (Darling-Hammond & Bransford, 2004). The former is used by the OECD to refer to teachers' capacity to interpret and implement curriculum and policy mandates ("informed prescription") at the local, school and classroom level to generate equitable and improved student outcomes through teaching and learning. Schleicher (2007) notes that many systems that have generated "high quality/low equity" results on PISA have tended to move towards strong prescription through high stakes testing and

accountability, with a lack of emphasis on teacher training, professional development and curriculum resources. The effect is teacher compliance and deskilling with, at best, mixed student outcomes results (Fullan & Hargreaves, 2002; Nichols & Berliner, 2007; Shannon, 2007).

This contrasts with Finland, Canada and other systems that have stressed a combination of: extensive and well-supported preservice teacher education, an emphasis on local, municipal, district and school-based curriculum planning, low-stakes assessment and classroom developmental diagnostic work, and varied and extensive professional development materials, resources and opportunities (Luke, Woods & Weir, 2008).

In major programmatic statements for the reform of US pre and inservice teacher education, Darling-Hammond and Bransford (2004) propose a model of "adaptive expertise". They contrast this with "routine expertise", which refers to the teachers' capacity to enact a pre-planned or scripted approach to curriculum and instruction with increasing degrees of precision. Routine expertise is a logical aim of initial pre-service teacher education. Drawing from economic analyses of workplaces and sociocultural psychological models of learning, Darling-Hammond (2008) argues that "adaptive expertise" entails the capacity to respond to new educational challenges (student diversity, youth cultures, new disciplinary knowledge demands, educational technologies, curriculum change) by using evidence to engage with and generate innovative and effective approaches to teaching. Hargreaves (2002) refers to this element of professionalism as "knowledge work" versus an industrial skills model of teaching. It is ironic, Schleicher (2006) notes, that many systems that aspire to lifelong learning, creativity, knowledge generation, problem-solving for their students have adopted an industrial model of disciplining and limiting teachers into "routine expertise" through what Welner and Oakes (2007) have termed "hard prescription". This is exemplified in the Title I/NCLB legislation in the United States, where the alignment of mandated reading program, scripted pedagogy, and accountability via test scores is implemented through professional development provided by corporate publishers of mandated programs (Berliner & Nichols, 2007).

To illustrate the distinction in terms of PD, we refer to a major quasi-experimental study of South Auckland teachers to be published in *Reading Research Quarterly*, McNaughton (in press/2008, 2009) contrasted the effects on student performance of two distinctive approaches to professional development and curriculum reform in reading comprehension. He compared a professional development approach based on the provision of an established, scaffolded approach to teaching reading comprehension with an approach that provided foundational principles and knowledges, outside consultative expertise, and then enabled teachers to develop their own curriculum programs and applications. While the implementation of the former, scripted approach was more rapid and showed more immediate effects; the latter approach demonstrated student

outcome effects that were more generalized (across the curriculum) and longitudinally sustainable. Citing this study, Timperley et al. (2007) document the importance of relevant and timely use of outside expertise and the importance of a sustained opportunities to translate theory and new knowledge into innovative practice.

Thirty years ago, Michael Apple (1978) warned of the danger of "teacher deskilling". By this he referred to the separation of teacher thinking (conception) from teacher practice (doing). His argument was that narrow training in 'how to' and teacher-proof curriculum programs might generate short term gains, but would not provide a professional base for sustainable improvement of schools and teaching and equitable student outcomes. His comments were prescient: the evidence from the hundreds of studies of US *No Child Left Behind* policy is that the mandating of scripted approaches to PD and to classroom teaching generate mixed results (cf. Luke & Woods, 2008).

References

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APPENDIX B: MEDIUM TERM PROFESSIONAL DEVELOPMENT TRENDS

Here we try to describe 'medium term' trends and developments in teacher education covering the period from 2009-2015. The current policy debate has focused on teacher quality, with COAG calling for incentive schemes for teacher recruitment, merit pay systems, and improved professional development. The debate over the National Curriculum has highlighted persistent calls for improvements of teachers' content knowledge of traditional disciplines, increased accountability and the mandating of specific pedagogical approaches. Further the expansion of NAPLAN and proposals for individual school reporting have focused systems on the improvement of principals' and teachers' use of assessment evidence.

There has been very little comment on the improvement of PD – despite the evidence cited above that PD is a primary means for increasing workforce capacity, expertise and outcomes. There has been little mention or endorsement of any specific approaches or models of PD in federal policy debates. This could indicate that the allocation of PD funding, systemic prioritization and implementation of PD will remain the jurisdiction of state governments and schools.

In what follows, we describe emergent PD trends and needs in two categories:

- the immediate effects of the current economic situation on schools, teachers and children;

- medium term scenarios based on prognosticated challenges for schooling.

In each of the following sections we discuss the general context, then move to specific PD challenges and issues. These discussions are by definition brief and partial. Our aim is to identify and mark out key areas, rather than to provide comprehensive reviews. Each area would constitute a future 'bid' for PD to be examined according to the proposed proforma. Note that some of these trends are ahead of published literature and that we have not had access to Departmental demographic, teacher data or student performance data as part of this exercise.

THE EDUCATIONAL IMPACTS OF THE ECONOMIC RECESSION

The impacts of the global economic recession on Australia and Queensland have been the subject of regular press and media coverage. While we have no way of gauging the depth or extent of economic recession or depression at this time: predictions have telescoped from one year to three in recent weeks. Organisations like *Access Economics* have predicted economic trends that are likely to have immediate and medium term impacts on communities and schools, families and children. Increased unemployment, high rates of family debt, mortgage defaults and increasing levels of poverty in mid-low and low IRSED communities are already in evidence in areas like Logan, Ipswich, the Gold Coast and the Sunshine Coast. The 2009 *Families Australia* report released by the federal government notes that prior to the current crisis 14% of families with school age children had no employment income, with an overrepresentation of single-parent families in the low SES areas. These figures will rise with recession and unemployment. Rural communities and regional cities are likely to be hit by declines in global resource demand and by drought and recession-related agricultural price and production issues.

It is quite possible, depending on the depth and duration of recession, that one fifth of Queensland children could be living in conditions of extreme economic hardship. There are a number of trends that have impacts on schools, teachers and classrooms:

- Increasing numbers of students in mid to mid-low socioeconomic communities whose families are undergoing economic stress - with affiliated issues around family break-ups, loss of housing and homelessness, inadequate provision of nutrition and health, uneven

access to affordable childcare and early education, and increases in domestic violence and abuse;

- Increasing numbers of adolescents engaged in risk behaviours;

- Increased intra and interstate movement due to unemployment and issues of housing affordability.

These trends will raise general issues of inclusivity and equity across the system with collateral effects on teacher stress levels. There may be a 'buffering' effect with announced increases in Federal spending on education – but much will depend on how and whether this funding is used effectively, and its sustainability will depend on government budgetary constraints as the recession deepens.

Particular regions and communities will be hit with particular force. While specific effects are difficult to predict – it is likely that these will have variable but significant impacts on the increasing number of migrant, refugee and second language students.

The overall challenges of increased cultural and linguistic diversity are discussed later in this review. Because of the current federal push for intervention and funding for Indigenous communities, and because of their low socioeconomic baseline status – we also will discuss Indigenous education separately below.

The actual systemic impacts of economic recession are mixed. Following patterns from the late 1980s and 1990s recessions – we could hypothesize that this could lead to a range of effects on students, enrolments and the teaching workforce, including:

- Increases in special needs, mental health issues, child welfare concerns, learning problems and behaviour management issues;
- Increases in secondary retention rates, with declines in the availability of youth employment;
- Decreases in non-state school enrolments, with mid-low and middle class families unable to afford school fees;
- Delayed retirement of teachers because of superannuation and investment losses; and,
- Increased enrolment and graduation rates in teacher education by workers seeking secure employment.

In terms of teacher PD needs, a host of practical and immediate priorities will arise.

First, Federal and state government initiatives in expansion of IT infrastructure, increased accountability through testing, and, in due course, the implementation of the National Curriculum will continue. This

will lead to a concentration of PD resources in these areas. *National curriculum implementation will emphasise teacher curriculum knowledge and content knowledge in specific KLAs.*

Yet there is a subtle but real danger that policy compliance pressures – particularly around testing and curriculum implementation – will contribute to a 'deficit model' in schools and unintentionally exacerbate problems (Comber & Kamler, 2004; see Appendix B). Further, during periods of economic recession, there is a tendency for policy and media debates to 'blame' teachers and schools and move towards "back to the basics" positions (Green, Hodgens & Luke, 1991). This could create a 'pincer' effect on teachers – where they feel pressured by larger systems compliance and roll-out pressures, are under renewed media and public scrutiny and criticism, while dealing with the increased stresses of daily classroom and community problems of unprecedented scale and scope.

To summarise the possible scenario: Through this convergence of effects, school leadership and PD will focus strongly on curriculum and content knowledge, and on testing and assessment compliance procedures. *Our view is that an emphasis on the professional use and technical expertise with evidence and data will be valuable and important* (Darling-Hammond & Bransford, 2001).

Yet this will occur during a period when teachers face immediate and pressing issues around everyday classroom interaction, learning and pedagogy, and pressing social problems in communities and schools.

In the current economic situation, there will be immediate PD needs for teachers working in mid-low and low IRSED areas, including:

- Developmental diagnostic issues: face-to-face and everyday assessment for learning and authentic assessment challenges to track student learning and to adapt and calibrate curriculum and instruction;
- Special education and inclusion issues: how to deal with increased levels of diverse learning problems in mainstream classrooms;
- Language and literacy issues: how to deal with language development and early literacy problems;
- Migrant, cultural diversity, refugee and second language issues: how to engage with culturally diverse communities and student populations and undergoing economic marginalization;
- Behaviour management issues;
- Identification and counseling issues around student malnutrition, mental health and depression; **a**dolescent alienation and risk-behaviours.

Using the taxonomy of teacher knowledge introduced above, many of these issues fall into the categories of *pedagogic content knowledge* and *knowledge of communities and learners*.

One possible strategy is a comprehensive PD approach that is targeted for teachers working in mid-low and low socioeconomic areas, adapted for the particular cultural and linguistic characteristics of specific communities.[7]

We table this strategy as a matter of extreme urgency.

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MEDIUM TO LONG TERM PD TRENDS

In this section, we draw on a number of sources to predict the immediate needs in schools for the next 5-10 years. These include *Queensland College of Teachers Professional Standards*, national and international research on teaching quality and professionalism, and current policy and data. In the following discussions, we identify five key areas that require teacher professional development, knowledge and learning:

- Indigenous Education
- Education for Sustainability
- Digital Learning
- Creativity
- Diversity
- Assessment and accountability

Many of these PD areas overlap with problems affiliated with new economic conditions described in the previous section. Here we treat them as separate medium-term 'bids' for PD development and work.

INDIGENOUS EDUCATION

[7] This would connect with the Queensland Teachers' Union policy focus on improving outcomes in economically marginalized communities. See http://www.qtu.asn.au/250208logan_community_launch.pdf, accessed 15/11/08.

The policy context

In September 2007, the Council for the Australian Federation released the *Future of Schooling in Australia* report, which included a new statement on the future of schooling in Australia, and a twelve point action plan to which all States and Territories have agreed. The report includes a commitment to improving Indigenous student outcomes, and points to the marked disparities that continue to exist between Indigenous and non-Indigenous student outcomes. It states that poor results limit the post-school options and life choices of students, perpetuating intergenerational cycles of social and economic disadvantage. Equality of opportunity is a tenet of the report, which provides for a commitment to improving Indigenous student outcomes (p.23).

Building strong Indigenous communities supported by learning and arts is a priority area for the Department of Education, Training and the Arts. The *Indigenous Education Strategic Directions 2008-2011* plan restates the Department's ongoing commitment to improving educational outcomes for Indigenous students. The plan sits within the broader strategic plans for the Department and aligns with *the Indigenous Learning and Arts Strategic Plan 2008-2011.*

In June 2007, QSA stated its commitment to incorporating Indigenous perspectives into curriculum, establishing this as a priority area for action for 2006-2008. QSA has developed an *Indigenous Languages Policy* that acknowledges the importance of understanding the diversity of Australian languages, and the intercultural understandings gained when these languages are valued within the Queensland curriculum.

Queensland College of Teachers Professional Standards (2006) require that teachers know and understand "Australian Indigenous culture and history", and "pedagogical approaches that result in high levels of expectation and achievement by Indigenous students across all learning areas" (see Standard Four). The preamble to the Professional Standards also makes mention of the *Report on Indigenous Education* (Ministerial Advisory Committee for Educational Renewal, 2004), and its findings that

> quality teaching attends to individual needs, sets high expectations, provides meaningful learning experiences and forms the basis for the rigorous pursuit of improved outcomes for Indigenous students (p.3).

Supporting teachers to include Indigenous perspectives in schools has been identified nationally as a key component to ensuring improved outcomes for Indigenous peoples in Australia. DETA's *Embedding Aboriginal and Torres Strait Islander Perspectives in Schools* calls for the provision of professional development for all Education Queensland

employees in Cultural awareness using *Crossing Cultures* resources. (See (http://education.qld.gov.au/schools/indigenous/docs/indig-persp.pdf, pp.8, 16, 18, accessed 1/11/08).

Indigenous Education PD

Current Federal policy debates have focused on unequal educational access and outcomes for Aboriginal and Torres Strait Islander students. Does the teaching of Indigenous studies and Indigenous students require specific knowledges? If so, how might they best be developed? What might it mean for creating an *inclusive* classroom environment? Phillips (2005) proposes key questions that can guide each step of teachers' work in addressing these goals. The questions include:

- What effect does your own cultural and historical position have on the development and enactment of Indigenous perspectives in your pedagogies?
- How could teachers integrate this knowledge/ understanding to reflect a more equitable and enabling approach to curriculum and pedagogy?

It is not our task to analyse or assess the various models of curriculum, instruction and school reform for Indigenous education that are currently under study and debate nationally. These include: phonics-based approaches to early literacy in Cape York schools; adaptations of the New Basics in Cape schools; the Cherbourg model of Indigenous school leadership; direct instruction models of genre and text use; adaptations of migrant English as a Second Language/Dialect instruction for Indigenous contexts; bilingual language maintenance; transitional bilingual programs; and approaches to community learning and culturally-appropriate pedagogy. There are, additionally, substantive issues about the timing and appropriateness of direct versus indirect instructional models, and of specialized 'remedial' versus mainstreaming models.

The evidence-based approach to PD described here will be of value in prioritizing which of these approaches will be most effective for which teachers and student cohorts in which settings.

From a state PD perspective, there is a need for a systematic induction and preparation for teachers who will work in Aboriginal and Islander community settings. These would familiarise them with cultural and historical contexts, the distinctive characteristics of student cohorts, and, indeed, introduce them to selected approaches noted above. In addition to an induction program, there need to be ongoing PD opportunities at the school and systemic level. The current focus on recruitment and retention of teachers working in Indigenous communities notwithstanding, all teachers working with Indigenous students require sustained PD support.

This will require evidence-based judgments on which approaches to support and implement.

There is also a need for PD that addresses that national goal that all Australian students develop an understanding of the socially and historically constructed nature of Indigenous and Australian culture, history and knowledge. QSA has made significant moves in this direction. Such understandings require that teachers acquire foundational knowledge in relation to cultural positioning, including their own, and the socially and historically constructed nature of knowledge about Indigenous Australians (Nakata, 2005).

Where possible, any development should include Indigenous elders and educators, and take into account the protocols and practices for the development of relationships of mutual respect and trust. Possibilities for addressing these professional needs should include:

- Co-delivery of professional development opportunities, including Indigenous representation and consultative mechanisms for Indigenous people

- Access to resources, including online syllabus materials that support ongoing professional learning and practices (see http://www.qsa.qld.edu.au/syllabus/3024.html).

- Strategies for the embedding Indigenous perspectives across the curriculum, and all learning areas.

- Evidence on and training with pedagogical approaches and specialised interventions which have demonstrable efficacy;

- Indigenous considerations in assessment policies and practices (Klenowski, in press/2009).

Sustainability

Policy contexts

The Stern Review (October, 2006) addressed the economics of climate change, and heightened awareness of human impact on the planet. *The Future of Schooling in Australia* (2007) is a first national attempt to address the significant social, political, environmental and technological changes since the *Adelaide Declaration on National Goals for Schooling in the Twenty-first Century* (1999). The Adelaide Declaration proposed that when students leave school they should have an understanding of, and concern for, stewardship of the natural environment, and the knowledge and skills to contribute to ecologically sustainable development.

Education for a Sustainable Future: A National Environmental Education Statement for Australian Schools (2005) provides a nationally agreed framework for Education for Sustainability within Australian schools and an orientation for State and Territory educational policies that provides for:

- schools as they decide on their education programs from K to 12;
- professional learning programs for teachers;
- reviews of curriculum documents that refer to the environment and sustainability in relevant learning areas in all the States and Territories of Australia;
- developers of education materials for schools;[8] and
- stakeholders who want to promote environmental education in schools. (Department of Environment and Heritage 2005, p.1).

Definitions and emergent trends

Teachers have a crucial role to play in educating for sustainable development (Brundtland report, in WCD, 1987). Education for Sustainable Development (ESD) has moved from foci on education *about* the environment, through Education *in, through* or *from* the environment, to models of education *for* the environment. ESD aims to develop the values and action skills, as well as the knowledges and processes, necessary for students to form their own judgments, participate in decision making and take action (Davies, 2008). To date, elements of ESD have been lodged within specific KLA units (e.g., science, SOSE). But given recognition of climate change and environmental issues, there is an increasing push to better integrate and feature ESD in schools. Much of this work has been developed through digital media (Sui & Bednarz, 1999).

The United Nations has declared 2005-2015 to be the Decade of Education for Sustainable Development (UNDESD). *Sustainability* is more than a new word for environmental education. Sustainable development "…meets the needs of the present, without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987). Sustainable development takes into account four interdependent dimensions: the social, economic, ecological, and political. Along with the impacts of global warming and climate change, other pressures include population growth and changing

[8] Queensland does not have in place a system for accrediting PD providers. This has been central to the Ontario approach, where the statutory curriculum body checks PD resources and materials for % alignment with the syllabus.

distribution, rapid urbanization, diminishing fresh-water supplies, loss of bio-diversity, and issues of recycling and waste disposal (Davis, 2008; UNESCO, 2002). These impacts are not evenly distributed, with the poorest developing countries hit earliest and hardest (Stern, 2006).

Principles of sustainable development include recognition and acknowledgement of diversity — ecological, economical, cultural, and social. The notion of "development" itself is scrutinized. New educational models are required that teach about unsustainable and destructive ways of living, and that encourage the development of active citizens who understand the ecosystemic implications of their actions. In this way, ESD is closely aligned with principles of social justice and equity (Pramling, Samuelsson & Kaga, 2008).

As in the climate change debate – there is a general tendency of the educational community to see ESD as a 'secondary concern' to immediate social and economic problems. *Given the rates of global environmental degradation, there is a real danger of continually delayed and deferred action on ESD curriculum reform, teacher training and PD.*

Curriculum resources

The *Statement on Sustainability for All Queensland Schools* (DETA) states the need for moving ESD from policy to practice, and the need for recognising that we all have an impact on the environment, economy and people of Queensland. While there is content and thematic space for sustainability in curriculum subjects (e.g. science, geography or studies of society), there appears to be no systemic linking between the areas of ESD, ICT and Media Education. This is despite emergent curriculum models built around the metaphor of 'design' in literacy, the arts, media and digital learning (e.g., Cope & Kalantzis, 2005). ESD highlights the study of ecological, political, emotional, and ethical differences, and focuses on changes to socio-economic and political structures, built environments and lifestyles. It insists on recognition and awareness of the importance of principles around equity, justice, democracy, respect, and action competence (Hesselink et al. 2000). This makes it ideally suited for cross-curricular integration.

The *Australian Research Institute in Education for Sustainability* (ARIES) (2003) was established in 2003 to undertake research that can inform policy and practice in ESD. ARIES "aims to identify key factors and impediments influencing sustainability education, evaluate existing approaches to environmental capacity building, and develop effective educational materials and programs to promote behavior change towards the sustainable use of Australia's resources" (***Department of the Environment and Water Resources,*** accessed 1/6/08).

The establishment of the *National Environmental Education Council* (NEEC) (2000) aims to raise the standing of environmental education nationally, while at the same time providing specialist counsel to the national government on environmental education. The *National Environmental Education Network* (NEEN) was established to advance Commonwealth, State and Territory inter-government activities in environmental education. Working groups incorporated within this network include the *Sustainable Schools Working Group* overseeing projects such as the *Australian Sustainable Schools Initiative* (AuSSI). Education Queensland is leading this initiative in Queensland (QESSI). Schools are encouraged to address sustainability by taking a whole-system and whole-school approach.

Teaching and Learning for a Sustainable Future is a web or CD-based program published by UNESCO that targets teacher education. It targets the professional development of both pre-service and in-service teacher education as well as providing a rich source of content for curriculum developers and policy makers. The program provides excellent ESD teaching related content and improves the digital literacy skills of teachers using the program. Teaching and learning strategies include: experiential learning (Kolb, 1999); story-telling (Denning, 2001); enquiry learning (Haynes, 2002); appropriate assessment (Dana, 2005); future problem solving (Crabb, 1998); learning outside the classroom (Gerber, Cavallo, & Marek, 2001); and community problem solving (Lasker & Weiss, 2003).

A core ESD framework is futures oriented; positive, hopeful and affirming; change oriented; transdisciplinary; community connected; lifelong and learner centred (Davis, 2008). The UNESCO (2002) "Sustainability Compass" identifies four points around which ESD raises questions for consideration, discussion and action: natural systems ; economic systems; social systems; and who decides*?*

Professional Development

Fereira, Ryan and Tilbery (2006) studied the success factors in PD on sustainability. They report on the effects three models - collaborative resource development and adaptation; action learning; and whole-of-system. Critical success factors are: funding and management; partnerships; program focus and pedagogical principles; level of participant engagement; level of intervention and approach to change. Their recommendations included: a systemic approach, multi-level foci, a process for ongoing support and involvement of teachers as change agents. These concur with the overall findings on PD effectiveness noted by Timperley et al. (2007) previously noted.

Professional development can equip teachers to understand trends, future prospects and directions of ESD. In order to improve the capacity of

teachers to address environment and development issues, professional development programs could address the following objectives, according to needs:

- To build knowledge about the concepts and principles of ESD;
- To relate the content of ESD to local curriculum and teacher education priorities;
- To plan for integration of ESD principles and practices in all subject areas across the school curriculum;
- To enhance skills for integrating issues of sustainability into a range of school subjects and classroom topics;
- To build a wide range of interactive and learner-centred teaching and learning strategies for ESD knowledge, critical thinking, values and citizenship objectives;
- To build capacity for multimedia-based approaches as a rich source of educational materials;
- To enhance skills in computer literacy and multimedia education.

DIGITAL LEARNING

Policy Contexts

The *Adelaide Declaration on National Goals for Schooling in the Twenty-first Century* Goal 1.6 of Declaration states that school leavers should "be confident, creative and productive users of new technologies, particularly information and communication technologies, and understand the impact of those technologies on society" (DEST: accessed 6/10/08).

Learning in an Online World (2000-2005), adopted by all Australian Education Ministers, constitutes a number of key policy documents that frame a national attempt to achieve Goal 1.6 from the Adelaide Declaration, while at the same time enabling "schools to integrate information and communication technologies into their operations, to improve student learning, to offer flexible learning opportunities and to improve the efficiency of their business practices" (MCEETYA 2004, p.2). Recent key priorities (*ICT in Schools Taskforce,* MCEETYA) address a range of technical and professional issues: increased bandwidth, K-12 interoperability, online content and professional development.

The Future of Schooling in Australia is the current national attempt to address significant social, political, environmental and technological changes. National trends in curriculum renewal show increased ICT

integration across all curriculum areas. The statements of learning for ICT, for Years 3, 5, 7 and 9, are around five interdependent organisers: inquiring, creating, communicating, ethics, and operations.

These ICT statements are integrated into the QCAR Essential Learnings developed by QSA. ICT is embedded across all the QCT Professional Standards for Teachers. This means that not only will practising teachers be required to make use of ICT in their classrooms, they will also be required to report upon students' use at critical junctures in all key learning areas. This is a critical departure from current practice (Lloyd, Cochrane & Beames, 2006).

Issues and problems

We have deliberately titled this section "Digital Learning" and not ICT in education. Our view is that the focus needs to shift from training teachers to use hardware and software, to using digital media for student (and teacher) learning.

After a decade of ICT innovation and major investments in infrastructure, curriculum materials development and teacher training – there is little experimental or systemic evidence of widespread uptake and use by teachers and little evidence of impacts upon conventionally measured student outcomes (Cuban, 2002; Warschauer, 2005). A recent international IEA study indicated that uptake rates by teachers were highly variable and subject specific (cf. Taalas & Kaanamarta, 2008). Infrastructure capacity, initial teacher training and PD appear to be contributing factors.

The documented case studies of innovative programs include the work of Pinkard (2005) and colleagues at the University of Chicago Charter School. Vasquez (2002) and others demonstrated educational and social development of migrant and second language students using digital technology in after-school centres. Further, this is an emergent literature that focuses on the use of video games, and on the use of new technologies for students in the arts, music and performance - based on popular, indigenous and community cultures (e.g., Gee, 2006; Knobel & Lankshear, 2004; Jocson, 2009). There is, then, qualitative evidence on the potential of digital educational models to re-engage at risk youth, to generate high quality digital and aesthetic student work, and to bridge the gaps between youth culture and schooling. In these cases, ICT resources and infrastructure are linked with media arts, media literacy and popular cultural forms (e.g., the *Fifth Dimension, Computer Clubhouse, La Clase Magica).*

Part of the problem may lie with the location of ICT in PD and system policy. Specifically, ICT PD and pre-service training is often disconnected from curriculum development and implementation. Our view of the

problem is that ICT policies and strategies need to very deliberately engage with existing student competence and everyday popular cultural uses (e.g., social networking, gaming), and are optimally adopted and used when useful links are made to specific curriculum areas (Luke, 2008). In a recent study of Finnish teachers, Taalas (2008) described the discrepancy between adolescents' everyday uses of digital technology and media and the everyday practices of teachers: youth typically were more frequent and sophisticated users. With the rapid expansion of cultural uses, of access an availability of educationally useful archives and creative commons, the PD challenge remains: to engage teachers in everyday uses and potential of ICT in their everyday lives and in their professional work, and to heighten awareness and understanding of youth digital culture.

Curriculum Resources

There are a growing number of international resources and support materials available for teachers. EU systems increasingly encourage teachers to use resources from other countries and regions. Here we will note key Australian sources. National *Statements of Learning* for ICT and English have been collaboratively produced by Australian education departments in an attempt to build in greater curriculum uniformity across the various jurisdictions. The National *Curriculum Corporation* provides major ICT and Media education projects. The Le@rning Federation (TLF) project:

1. Established standards that allow for interoperability of online content across various platforms and operating systems;
2. Produced 4581 digital learnig objects in the six priority curriculum areas of Science; Mathematics and numeracy; Literacy for students at risk; Studies of Australia; Languages other than English (Chinese, Japanese and Indonesian); and Innovation, enterprise and creativity;
3. Opened access via TLF to a range of digital resources from various public and government sites (see for example Australian Screen Online below);
4. Conducted pilot research studies on the use of TLF online curriculum content.

Smart Classrooms, part of an overarching state wide initiative termed the *SmartState Strategy 2005 – 2015,* includes a web-based portal through which individual schools gain access to a virtual environment enabling students, teachers and administrators access to assessment reporting structures, learning and content management, online curriculum resources and ICT professional development.

The oz-Teachernet is national online community of teachers serves as both a portal to professional discussion lists related to ICT education as well as

providing resources and the dissemination of ICT research projects. (See http://www.oz-teachernet.edu.au/, accessed 10/11/08).

The Learning Place is the Queensland Department of Education, Training and the Arts e-learning environment. It provides a supportive online community function for individuals or classes to meet electronically and share ideas and resources, access professional expertise or access online content across the full range of the curriculum. Students and teachers engage with for example online projects, travel buddies and virtual field trips. Training and professional development is offered, and users access Blogs, chats, forums, teleconferencing, podcasting and MOOs. The largest component is the *Curriculum Exchange,* which serves as a curriculum gateway to learning objects and digital resources of The Le@rning Federation. This site also provides access to well over 10,000 online curriculum resources. (See http://education.qld.gov.au/learningplace/, accessed 8/12/08).

The ICT Learning Innovation Centre currently provides a state-of-the-art ICT facility directed at the use of ICTs in education. The centre offers a location for educators to explore innovative ICT practice across the teaching, learning and administrative aspects of schooling and hence serves a key role in the professional development of Queensland's teachers. In addition, the centre serves as a location where emerging technologies and ICT pedagogy can be trialled and tested. (http://www.learningplace.com.au/defaulteqa2.asp?orgid=35&suborgid=234, accessed 8/12/08).

Australian screen online is an online repository of the Australian film and television industry that serves a promotional and educational function. The site sorts information from Australian feature films, television programs, documentaries as well as television programs and newsreels. In terms of Film and Media Education, the site provides notes for teachers that help structure classroom activities (negotiated copyright has been obtained for all accessible material). (See http://australianscreen.com.au/, accessed 4/12/08).

Professional Development

Over the last decade, approaches to PD have shifted with the field. They cover a broad range: 'how to' basic tech skills, introductions to digital learning resources and tools, the use of learning objects, sociocultural approaches to pedagogy and interaction, and introductions to multiliteracies and multimodality. The PD literature refers to early, late and resistant adopters of such technologies. A continuing concern is the widening gap between 'early-adopters', who continue trialling the latest tools and 'late-adopters', who struggle at the level of techno-literacy, and often move to become 'resistant-adopters' (Wilson & Stacey, 2004). An OECD study of Nordic countries showed that in some jurisdictions there

has been a residualisation of use and uptake after "first wave" enthusiasm (Ayres, Luke & Johannson, 2007). Taalas (2008) attributes this to rapid change in the field, and teacher cynicism about unfulfilled claims about the educational effects of ICT.

In a 2004-2005 QSITE study (Lloyd, Cochrane & Beames, 2006) four necessary and interdependent elements of ICT professional development emerged. These were: context, time, community, and personal growth (p.17). According to Lloyd and Cochrane (2006), effective professional development has to immerse an individual in *community*, directly address the *context* of teaching and learning, add to *personal growth*, and be both 'over' time and 'in' *time*. These elements are to be viewed as being the stepping-stones between practice and theory (p.19).

In order to improve teachers' capacity to learn *with* students as they explore digital literacy and culture, professional development programs could address the following objectives, according to needs:

- Support and enhance teachers' own learning, digital literacy and everyday cultural uses;
- Develop models of students as digital experts and mentors;
- Develop awareness and understanding of students' digital cultures;
- Introduce ICT as part of a larger digital media arts agenda encompassing creativity and artefact making;
- Provide access to expanding knowledge archives;
- Develop basic technical capacity via teamwork, discussions, projects, research;
- Provide curriculum-specific approaches;
- Engage with social networking, blogs, wikis and other community and identity-building resources;
- Expand online educational professional networks;
- Understand digital risk issues and ethical, access, copyright and creative commons protocols;
- Focus on accessible apaches to everyday pedagogy.

CREATIVITY

Policy Contexts

As early as 1994, the Australian federal Government produced a major policy initiative, *Creative Nation*, which recommended a charter which included " the right to an education that develops individual creativity and appreciation of the creativity of others" (preamble).Creativity is a curriculum priority in the *DETA Strategic Plan 2008–2011.* The *Research Priorities for Education Queensland 2008-2010* document calls for research into best ways to develop and plan for a culture of creativity (p.10). In this context, creativity is affiliated with the arts. This raises questions around the promotion and assessment of creativity as a generic capacity (Reid, 2005) in schools, the broader community and economy.

There are current international trends for the educational policies of countries to place more emphasis on the development of creativity as an element of new human capital. *A Creative Workforce for a Smart State* (2004) maintains that "If teachers are to participate in and serve the burgeoning needs of the future – where creativity, innovation, risk, autonomy and self-management are the secret life that drives economic and social development – then they need a make-over" (p.9). This policy looks at creativity as intrinsically linked to innovation: capacities "fundamental to the triple bottom line – economic, social and ecological sustainability – in the 21st century". The OECD has declared "innovation" as its key educational theme for 2009, noting the importance of creativity and entrepreneurship.

The Queensland DEETA Annual Report (2006-2007) included two documents: *A Creative Queensland* and *Creative generation.* In *Creative Queensland* the Department encourages the engagement of children, young people and students of all ages in programs that develop their creative potential. For the most part, this was linked with the arts and ICT. *Creative generation* refers to Queensland's innovative and dynamic arts scene, and encourages the provision of opportunity for talented arts students to refine, challenge and extend their artistic practice. The *Creative Generation Excellence Awards in the Arts* aim to nurture our future artists to ensure they play an integral role in further enhancing and developing the creativity of our state. The young creative thinkers of Queensland are seen as "an important investment for the future of the Smart State".

These policies link creativity and innovation with the arts *and* technology, with an emergent recognition that traditional creative arts are but part of the curriculum picture. To date, there has been little work done on embedding creativity across the curriculum. As noted, to date Australian PD in ICT has not strongly emphasised digital arts, despite the case-based evidence and new curriculum models. Further, the policy emphasis on

testing of basic skills and knowledge has drawn attention away from creativity, given the difficulties in larger scale assessment of creativity.

Definitions

The new paradigm of creative industries is based on shift from a traditional industrial focus on resources and manufacturing to media based, information economies (Cunningham, 2005). In 2003, Singapore set GDP targets for creative industries – including music production, cinema and TV, IT and new media.

In educational terms, the renewed focus on creativity is the result of decade-long attempts to identify the new 'generic capacities' requisite for globalised economies (Reid, 2005). Problem-solving, collaboration, entrepreneurship, digital literacies, innovation and creativity are among the suite of cross-curricular capacities described in many EU and Asian curricula. The latter cluster of capacities are closely linked in the creative industries paradigm.

This marks a break from the longstanding assumption that 'creativity' is the principal domain of music, arts, and literary curriculum. The argument is that creative and innovative thinkers are key drivers for social reform, renewal, and economic growth (Florida, 2004; Landry, Mahesh, & Hartman, 2005). Organisations attempting to leverage these drivers foster creativity and innovation in workers through an emphasis on their constant learning, by encouraging risk taking, and by promoting more flexibility and freedom (Martins & Terblanche, 2003). Such workers are said to produce a diversity of novel artefacts — in the form of ideas, products, processes and/or solutions.

Yet the term creativity is amongst the most contested in education (Claxton, 2002). Typically, definitions include reference to originality and usefulness of ideas or products (e.g., Ohlsson & Kershaw, 2003; Plucker, Beghetto & Dow, 2004; Runco, 2003; Sternberg & Lubart, 1999). That is, for a product/artefact/idea to be considered creative, it must be new, novel, original, and/or must be recognised by peers and communities as useful and making a contribution. The concept of design, referring to an aesthetic marriage of form and function, has become key to educational approaches (Cope & Kalantzis, 2005). If teachers are to teach for creative thinking, an understanding of creativity and cognition is required. In order to think beyond technology as the tool, a serious look at creativity goes beyond the the left-brain/right brain formula, and the notion that creativity is the exclusive domain of the arts. Pink (2005) identifies six high-concept, high-touch skills: Design, Story, Symphony, Empathy, Play, and Meaning.

Rollo May (1975, p.39) insisted that creativity must be seen in the work of the scientist as well as that of the artist**,** in the thinker as well as the aesthetician (p.39). The linguistic and interactional similarities between

scientific and artistic learning are described in studies of UK educational reforms (Heath, 2005).

Educational Approaches

There are two fundamental debates about creativity. Both of these debates have important implications for educators. The first is whether creativity is principally an individual or collective. Systems perspectives (Csikzentmihalyi, 1999), cross-cultural (Niu & Sternberg, 2002) and socio-cultural (Hasse, 2001; John-Steiner, 2000) studies offer competing perspectives. The former stresses individual cognitive processes, while the latter describes collaborative conception and production.

The second debate about creativity asks whether it is driven by innate ability or is teachable. Gardner's (1993) study of creative lives looks for commonalities between creative people across various domains, and identifies both "natural" traits and key learning experiences which have enhanced creativity. Recent empirical studies provide evidence of measurable improvements in children's test results and performance, as a result of specific interventions, aimed at supporting the development of creativity. *Champions of Change* (Fiske, 1999) identified how the arts provided opportunities for learning and engagement linked to higher levels of achievement in standardized tests for literacy and numeracy. Grant (2004) investigated the impact of science explorations and drawing following exposure to Picasso's art, and demonstrated the variation in responses from children and teachers. Recent curriculum models in Queensland (e.g. *New Basics*) stressed the importance of embedding creativity in assessable tasks that focused on individual and collaborative artefact production.

The challenge is to engage with the range of cognitive and social factors in the creative process. Teachers may design learning programs which emphasise individual creative pursuits and activities, and measure each student's creative achievement. They also may design programs which encourage and reward the pooling of ideas, skills and knowledge, leading to group engagement with projects, problems, and creative solutions and products. Here, teachers would assess what contribution each student's creativity makes to the larger group. Pink (2005) proposes assessable attributes:

> imagination, teamwork, flexible thinking, innovation, technical proficiency, problem solving, problem finding, inventive solutions, capacity to generate action, capacity to enact leadership.

A review of current research indicates the following pedagogical approaches and strategies as some of the most effective and appropriate for the teaching of creativity in schools, and as a challenge to educators:

- Capitalising on the teachable moment (Claxton, 2002; Baumann, 2004);
- Production of popular media and youth culture genres (Sefton-Green, 2005)

- Theorising — linking "everyday theories" children hold with currently accepted scientific and aesthetic understandings (Fleer & Hardy, 2001; Seefeldt, 2004);
- Diverse interactive teaching and learning strategies;
- Questioning and dialogic strategies (Fleer & Cahill, 2001);
- Cross curricular projects and inquiry-based learning;
- A focus on environmental contexts — physical and emotional, supportive (Edwards, Gandini & Forman, 1998);
- The use of artists and community expertise to work with teachers and children (Burnaford, Aprill & Weiss, 2001; Capezzuto & Da Ros-Voseles, 2001);
- Linking artistic and scientific processes (Heath, 2005).

Professional Development

Professional development can equip teachers to understand trends, future prospects and directions of teaching for creativity and the creative industries. In order to improve the capacity of teachers to address creativity, new technologies, new arts and multimodality, PD programs could address the following objectives, according to needs:

- Building teachers' understandings, experience and knowledge about creativity, concepts, principles and practices;
- Engaging with teaching as creative work and performance;
- Planning for creativity to be integrated in all subject areas across the school curriculum;
- Exploring linkages with youth popular culture and media;
- Enhancing skills for integrating creativity into school subjects and classroom topics;

- Moderated and peer assessment of student creative artifacts and performance;

- Embedding digital arts across the curriculum and in assessable tasks.

Diversity and Inclusion

Policy Contexts

As noted, issues of inclusive education will be focal in current economic conditions. The new Queensland demographics of cultural diversity will be influenced by widening socioeconomic disparity, with differential impacts on Indigenous, migrant, refugee, and second language communities. Current federal and state policy has a renewed emphasis on equality of educational access and opportunity, with targets for improving the educational participation levels and outcomes of students from marginalized communities. NAPLAN testing results are likely to be disaggregated by equity groups, with continuous tracking of the "equity gaps". Issues of diversity and inclusivity are back on agenda at the policy, school and classroom level.

Currently, there is wide acceptance of the need for teacher knowledge and skills in planning and implementing programs that respond to the diverse knowledge of students, their families and communities, that build on students' strengths, and cater for diverse learning styles (*QCT Professional Standards,* 2006). According to QCT, teachers need to acquire baseline understandings of how socio-economic circumstances, location, gender, sexuality, ethnicity, culture, language, religious beliefs and individual needs impact on the world views of students. They also require developmental diagnostic skills for assessing individual learning needs, including those of students with disabilities and learning difficulties and of gifted students (p. 10).

Relevant policy and procedure documents through DETA identify processes, responsibilities and procedures to enable Education Queensland staff to operationalise *Inclusive Education Statement 2005*. Inclusive education recognises and actively addresses injustice and disadvantage, responds to individuals and communities so all students can access schools and achieve learning outcomes, and develop skills to work and live productively and respectfully with others from a range of backgrounds, abilities and cultures (*Inclusive Education,* http://education.qld.gov.au/strategic/eppr/curriculum/crppr009/, accessed 1/11/08*).*

In addition, Federal policy and the National Curriculum will renew efforts in LOTE. In Education Queensland policy, Regional Executive Directors

oversee the development of the *Regional LOTE Education Plan*. This applies to all regions from 2009. Those schools choosing to provide LOTE must address the QCAR Essential Learnings each year. The *Regional LOTE Education Plan* provides strategies and targets to deliver the desired outcomes:

- quality, contemporary LOTE programs to develop language skills and intercultural understanding;

- an increase in the percentage of Year 12 students who complete LOTE studies.

Each *Regional LOTE Education Plan* will implement strategies designed to provide a number of outcomes, including: continuity of learning of the same language to students from primary (entry level) through to Year 12; and maximisation of professional support to teachers to deliver LOTE programs for language *and* intercultural understanding.

Educational Issues

Learning is always mediated by individuals' life experiences, cultural, linguistic and social backgrounds. There are robust debates over models of inclusive pedagogy, culturally appropriate and sensitive pedagogy, and perennial debates over 'whose cultures' will count in curriculum. Culturally responsive curriculum and teaching is premised on teachers' knowledge of students' languages, communities and cultures. Decisions about remedial, 'pull-out' and direct instruction also require knowledge of student background and capacity. In addition, teachers need to be prepared for learning differences and disabilities in inclusive classrooms. This entails both community liaison work and developmental diagnostic work on students' background knowledge, strengths and difficulties.). If teachers are to teach children with special needs effectively, they require observational and diagnostic skills and a wide repertoire of strategies (Darling-Hammond & Bransford, 2005, p. 255).

Over the past decade, the percentage of Queensland students learning English as a Second Language has doubled. The percentage of students with ascertained learning difficulties continues to rise. As noted, the proportion of students from low socioeconomic communities and families is increasing. Diversity - of world view, linguistic, religious and cultural background, and of approach to learning – is a feature of all Queensland classrooms.

According to the 2001 ABS reports, there are over 250 languages spoken in Australia. Most recently, the regional focus of the government humanitarian program remains on Africa, followed by the Middle East and South West Asia, and with an increased emphasis on Asia. This

reflects the resettlement priorities of the UNHCR. While Australia has a history of receiving immigrants, to date they have been mainly from European countries or, more recently, Vietnam and South East Asian countries. For parents who have recently migrated to Australia, enrolling their child in school can be the paradigmatic moment of home/school cultural mismatch (Dachyshyn, 2004; Kirova, 2001; Multicultural Health Brokers Co-op, 2004). In addition to transitional ESL support provided to migrant communities, increasing numbers of refugee students will require specialized cultural and social support (Taylor & Matthews 2004). Anti-racist educational strategies and approaches have been adopted in several states (Milovich et al. 2001).

Because of Australia's history of multiculturalism, economic links, and geopolitical location, there will be an increasing recognition of the potential benefits of LOTE for individual students, their families and communities. The introduction of students to other languages provides access to other peoples, ideas and ways of thinking. In economic terms, it provides access to employment and globalised markets.

LOTE also has the potential to provide students with the means to build understanding for and engagement with other cultures. The post-9/11 social divisions between cultural and religious groups that have arisen in many OECD countries have led to renewed emphasis on intercultural understanding as a generic capacity.

After two decades of equity policies and a decade of policies mandating the inclusion of students with disability and impairment, few simple answers are on offer. Developing an inclusive practice goes beyond understanding special education policy and identifying special instructional strategies that will help students with disabilities.

The comparative evidence indicates that high quality/high equity education systems (e.g., Canada, Finland) recognise students' different approaches to learning and build these into curriculum and planning, while maintaining expectations that all students will have education outcomes that enable opportunities to participate in civic and economic life (OECD, 2005). They provide systemic support for student diversity in stated policy, resources and practice (Levin, 2009).

Teacher knowledge issues

Teacher expertise is a significant determinant of equity of student outcomes (Betts, Rueben & Danenberg, 2000; Goldhaber & Brewer, 2000). If teachers understand how students' achievements and successes are influenced by their life experiences, gender, race, ethnicity, social and cultural location, and individual abilities, then they can incorporate these experiences into curriculum and pedagogy. To build culturally responsive practice, teachers need to have a broad set of teaching strategies for

working with diverse children. They also need to examine and understand their own cultural assumptions and biases to understand how these shape their classroom judgements and practices. Teaching diverse learners requires selecting materials that are inclusive of the contributions and perspectives of different groups (Delpit, 1995). This demands rich content knowledge that includes multiple perspectives within a field (Lee, 1993).

Student learning can also be enhanced by developing and modifying assessment strategies to accommodate differences and enhance learning (Klenowski, in press/2009). This requires knowledge of a range of assessment strategies, an understanding of their technical and cultural limitations, and a classroom focus on communicating school expectations and learning strategies (Delpit, 1995).

Professional Development

Acquisition of teacher cultural self-knowledge, cultural and linguistic knowledge, culturally informed pedagogy, knowledge about learning differences, and knowledge of home-school relationships is a complex enterprise. Knowledge of learners and knowledge of self can be acquired through dialogue with students and communities. Guided reflection can help teachers make sense of what they see and hear and helps them to learn how to sue this knowledge to design curriculum appropriate to the students they teach.

There is a vast literature on PD for cultural diversity (see the journals: *Teaching Education, Teaching and Teacher Education, Journal of Teacher Education).* PD around these issues could address the following, according to need:

- Knowledge of general principles of inclusion and equity;
- Descriptions of the impacts of 'deficit' models on classroom practices and student outcomes;
- Direct engagement with school communities, families and elders;
- Reflection on one's cultural norms, assumptions and background;
- Strategies for teaching transitional bilingual students;
- Understanding of the complex relationships of gender, class and culture;
- Program design to address the needs of diverse learners;
- Guidance for teachers and other professionals working with children of immigrants and refugees;

- Understanding of discriminatory practices;
- Anti-racist curriculum and negotiation strategies;
- Principles and curriculum for intercultural communication;
- Improved understanding of social, cultural and religious differences.
- Exploration of cultural biases in assessment.

ASSESSMENT

Policy Contexts

The *Smarter Learning: Queensland Curriculum, Assessment and Reporting Framework* (QCARF) is a key component of Stage 2 of the Smart State Strategy announced in April 2005. This builds on several initiatives implemented across all schools, including the *ETRF*, *Schools Reporting*, and the QCE. The purposes of the development of QCAR include the improvement of student learning and setting new standards in curriculum, assessment and reporting.

In addition to improved student learning, the use of standards in the reporting framework aims to help parents understand what their children know and can do, and how well they can do it. The standards are intended to: define essential learnings, support teachers' everyday assessment practices, introduce statewide assessments in the middle years, and provide easy-to-read reports for parents. Parents can see whether their children's performance is above, below or on par with expectations.

The QCAR framework aims at "de-cluttering" the curriculum, focussing the P–10 curriculum on Essential Learnings, and the assessment of student achievement against agreed standards. Teachers are provided with access to high-quality assessment tools and tasks. New statewide assessment will be introduced to measure student achievement in the essential learnings against standards at key points in the middle years.

Key definitions

Assessment, the considered evaluation of performance, is a key formative tool in selecting and adapting curriculum and effective pedagogy. It is a key summative tool for curriculum development, credentialing and accountability. It provides parents and families with important information on individual student performance. Teachers use range of assessment practices. These include face-to-face judgments based on listening and observation, evaluation of student artifacts, global and

holistic judgments of student capacity, background knowledge and progress, moderated teacher judgment of student development, rubric scoring and grading, portfolio assembly, testing and examination. There is an increasing availability of digital tools for assessment, for student portfolios and for record keeping.

In the current accountability climate, it is essential that teachers understand the principles and practices of assessment and the importance and usefulness of accurate data and evidence. Further, in "evidence-based teaching" (Darling-Hammond & Bransford, 2005), teachers develop the knowledge and skills to be able to read, understand, analyze and use data, to weigh the value and limitations of assessment tools and approaches, and to translate these into decisions about cohorts and individuals. This requires familiarity with basic principles of assessment, including validity, reliability, generalisability, construct, task, and item. Contemporary paradigms of assessment are based on general meritocratic and humanist principles: fairness, equality, caring for the well-being and whole development of students and staff, integrity and honesty (Day et al., 2000 p. 39).

When accurate and useful data has been generated, teachers are able to evaluate and integrate particular curriculum materials into instruction in ways that are appropriate for the teacher's goals, for the content under study, for individual students. They are able to address key system and school goals. Finally, data can be shared, and teachers can reflect with one another to fine-tune their instruction (Cohen & Hill, 2000).

Current demands on schools include imperatives of: systemic, stakeholder and professional accountability, curriculum reform, and an environment of competitive educational markets. Demonstrations of educational achievement are essential for approved and accredited programs. This can take a range of forms: large scale testing programs; aggregate program and school evaluation.

To date Queensland schools have relied on a combination of classroom-based teacher assessment, systemic moderation systems based on principles of authentic assessment and assessment for learning (Klenowski, 2002), and standardised norm referenced achievement tests. These approaches to assessment have both strengths and limitations in terms of the range of human capacities, performances and achievements in specific domains they can describe. For example, standardised norm referenced achievement tests have been developed to assess behaviourally replicable skills and knowledge; while moderated teacher judgment has proven to be a valid mode for assessing student performance and artifacts. As noted, many emergent areas of the curriculum – digital literacies, multimodality, creativity, collaboration – have proven difficult to assess. Further, conventional assessment generally does not cover a range of

social outcomes (e.g., attitudes and values, peer relations, identity) (Ladwig, in press/2009).

High stakes testing moves assessment beyond the confines of the individual teacher, student and local community, with the aim of providing reliable and comparable information about student achievement across schools, systems and countries. The data generated through this testing can be a lever for productive change. It can be used to make cases for funding, changes to practices, curriculum development, school structure and leadership. In the US and UK, student performance on high stakes testing is now used to evaluate teacher and school performance. The actual systemic uses and effects of large scale testing remains contentious, with documented cases of test score manipulation and misrepresentation (Nichols & Berliner, 2005).

In Queensland, Years 3, 5 and 7 students are tested in literacy and numeracy. Data is reported individually, by schools, and according to state averages and national benchmarks. Since 2006, every Education Queensland school has been required to publish information about the school and its outcomes on its school website. Also since 2006, summary information is released on each school that has students in Year 12. An annual statewide Next Step survey generates data on Year 12 graduates, and their employment, study and life choices in the year following their graduation.

Regular and clear reporting to parents is part of the relationship between school, home and the community. It requires a common reference point for teachers, parents and students. Standards increase the alignment of curriculum, assessment and reporting, and provide and a shared language for describing what is expected of students and the quality of student achievement at key points along the P–10 learning continuum.

Teacher learning and knowledge, curriculum

One of the key findings of the QSRLS study (Lingard et al., 2002) was that many teachers' "assessment literacy" was limited. Assessment literacy was defined as the capacity to set meaningful and challenging classroom tasks. In their discussion of US teacher education, Darling-Hammond and Bransford (2005) claim that the majority of teachers may have limited knowledge of formative assessment strategies and may think about assessment as grading. Hargreaves (2005) notes that many Canadian teachers perceive high stakes testing as leading to a reduction in the range of teachers' teaching, stifling classroom creativity and a hindrance to learning. While Queensland early and senior teachers demonstrate significant levels of assessment expertise via moderation and profiling systems, the QSRLS data would suggest that there is a need for substantial PD in other grades. QCAR and NAPLAN implementation will increase the need for training.

Much of the policy debate over testing is focused on issues of the uses of results. Results from high stakes assessments can be used to improve instruction. But teachers, principals and systems bureaucrats would need a clear idea of the functions of standardised testing, technical and scientific limitations, issues of cultural and linguistic bias, its relation to curriculum design and pedagogy, and how to read, understand, analyze and use data.

Professional Development Modes

Extensive use of case study methods, teacher research, performance assessments, and portfolios can provide rich data and learning experiences. Other modes linked to our discussions of digitalization and creativity include performance, presentations, interviews, exhibitions.

Other modes for professional development in this area could incorporate the range of resource banks available, such as the QCAR assessment bank, which features: access to high-quality assessment tools for collecting valid and reliable evidence of student achievement; models of good assessment practice for development of their own assessment tools; resources to support consistency of teacher judgments; and support in basic assessment knowledge and skills.
(http://www.learningplace.com.au/deliver/content.asp?pid=38957, accessed 1/12/08)

PD in assessment could include:

- Training in basic descriptive statistics to understand data, in order to use the information for improving curriculum and instruction;
- Introduction of basic principles of testing (e.g., domains, constructs, items, validity, generalisability, reliability), in order to understand the strengths and limitations of specific instruments;
- Introduction to techniques of authentic assessment and assessment for learning, including the use of rubrics and teacher moderation processes;
- Face-to-face assessment for learning protocols;
- Development of developmental diagnostic capacity;
- The setting and assessment of rich tasks;
- Skills and knowledge to understand and use empirical data to inform practice, and meet the needs of groups of students;

- Self assessment, and being observed and receiving feedback on professional classroom practice;

- The principles and practices of "culturally appropriate" assessment (Luke et al. 2002; Klenowski, in press/2009).

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